Code No: R05220202 **Set No. 1**

II B.Tech II Semester Supplimentary Examinations, Aug/Sep 2007
LINEAR AND DIGITAL IC APPLICATONS
(Common to Electrical & Electronic Engineering and Instrumentation & Control Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Define input offset voltage and CMRR as applied to Op-amp ICs.
   (b) Explain how the above parameters can be measured? [8+8]
2. (a) Explain HWR using inverting and non-inverting configuration.
   (b) Explain the operation of astable multivibrator using Op-amp. [8+8]
3. (a) Draw the circuit diagram of a low-pass sallen key filter and determine it's gain.
   (b) Draw the block diagram of a band rejection filter and explain it's operation. [8+8]
4. (a) Draw the block diagram of 565 PLL and explain about each block. Make circuit connections to track the input signal and explain its operation.
   (b) Write short notes on :
      i. PLL as frequency multiplier.
      ii. PLL as frequency translator. [8+4+4]
5. (a) With an example explain the functional diagram of successive approximation ADC.
   (b) Draw the schematic circuit diagram of a Servo A/D converter and explain the operations of this system.
   (c) Compare Servo A/D with other types of A/D converters. [7+6+3]
6. (a) What is meant by Tri-state logic ? Draw the circuit of Tri-state TTL logic and explain its functions.
   (b) Draw the schematic circuit of TTL active pull-up NAND gate and explain its operation with the help of Truth-Table. [8+8]
7. (a) What is multiplexer? Draw the logic diagram of 4 to 1 line multiplexer?
   (b) Design half adder using NAND gates only? [8+8]
8. (a) Write short notes on synchronous up counter.
   (b) Explain the operation of Synchronous SRAM with the help of its internal Architecture. [8+8]

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Code No: R05220202 **Set No. 2**

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Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
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1. (a) Define slew rate and derive the expression for it. List causes of the slew rate and explain its significance in applications.
   (b) Explain the difference between slew rate and transient response. [10+6]
2. (a) Explain with a neat circuit diagram the working of voltage to current converter with floating load and grounded.
   (b) Design a circuit to convert a 4 mA to 20mA input current to 0V to 10V output voltage. The circuit is powered from ±15V regulated supplies. (Assume necessary data) [10+6]
3. (a) What are the advantages of active filters? Explain wideband band pass filter together with it?s amplitude response.
   (b) What is phase shifter? With respect to schematic explain the operation.[8+8]
4. (a) Explain the operation of Astable multivibrator using 555 timer.
   (b) Design a Monostable multivibrator using 555 timer to produce a pulse width of 200 ms. [10+6]
5. (a) Sketch and explain the transfer characteristic of a DAC with necessary equations.
   (b) LSB of a 9-bit DAC is represented by 19.6 m Volts. If an input of 9 zero bits is represented by 0 volts.
      i. Find the output of the DAC for an input, 10110 1101 and 01101 1011.
      ii. What is the Full scale Reading (FSR) of this DAC? [8+8]
6. (a) Explain the following terms with reference to TTL gate?
      i. Logic levels.
      ii. DC Noise margin.
      iii. Low-state unit load.
      iv. High-state fan out.
   (b) List out TTL families and compare them with reference to propagation delay, power consumption, speed-power product and low level input current? [8+8]
7. (a) Design a serial binary adder?
   (b) Design a full subtractor with logic gates? [8+8]

8. (a) Explain 4 bit serial in parallel out register.
   (b) Draw the circuit of edge trigged SR flip flop made up of by basic gates & explain the operation. Sketch the wave form. [8+8]

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Code No: R05220202 **Set No. 3**

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Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Explain the open loop and closed loop operations of an Op-amp.
   (b) Explain different methods to increase the input resistance of an Op-amp.[8+8]

2. (a) Draw the circuit diagram of a two input non inverting type summing amplifier and derive the expression for output voltage.
   (b) Briefly explain why negative feedback is desirable in amplifier applications.
   (c) How does negative feedback affect the performance of an inverting amplifier? [7+5+4]

3. (a) Derive the transfer function for a general second order sallen-key filter with suitable circuit diagram.
   (b) With suitable circuit diagram explain the operation of a triangular wave generator using a comparator and an integrator. [8+8]

4. (a) Give the functional block diagram of NE 565 PLL and for the given component values. C_1 = 390PF, C_2 = 680PF and R_1 = 10k,V_{cc} = $\pm$ 6V. Find
      i. The free running frequency.
      ii. The lock range and capture range.

      Where C_1 is the capacitor connected between pin number 9 and - V_{CC}, C_2 is the capacitor connected between + V_{CC} and output pin 7, and R_1 is connected between pin number 8 and + V_{CC}.
   (b) Give the functional block diagram of VCO NE566 and explain its working and necessary expression for free running or center frequency.

5. (a) Explain the operation of a multiplying DAC and mention its applications.
   (b) A 12-bit D to A converter has a full-scale range of 15 volts. Its maximum differential linearity error is $\pm$ 1/2 LSB.
      i. What is the percentage resolution?
      ii. What are the minimum and maximum possible values of the increment in its output voltage? [8+8]

6. (a) Compare different logic families and mention their advantages and disadvantages?
   (b) Which is the fastest non-saturated logic gate? Draw the circuit and explain its functions. [8+8]

7. (a) Design a serial binary adder?
   (b) Design a full subtractor with logic gates? [8+8]
8. (a) Write a note on applications, advantages and disadvantages of SRAM.
   (b) Design MOD 6 synchronous counter. [8+8]

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Code No: R05220202 **Set No. 4**

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LINEAR AND DIGITAL IC APPLICATONS
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Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) What are the three differential amplifier configurations? Compare and contrast these configurations.
   (b) What is a level translator circuit? Why is it used with the cascaded differential amplifier used in Op-amps?
   (c) Explain the term"Slew Rate" and how it affects the frequency response of an Op-amp? [10+3+3]
2. (a) Discuss important characteristics of a comparator and the limitations of Op-amps as comparators.
   (b) Explain the operation of Schmitt trigger circuit. [8+8]
3. Write short notes on the operation of any two:
   (a) Quadrature oscillator.
   (b) RC phase shift oscillator.
   (c) Wien- bridge oscillator. [16]
4. Describe any two applications of 555 timer in
   (a) Astable multivibrator configuration.
   (b) Monostable multivibrator configuration. [8+8]
5. (a) With an example explain the functional diagram of successive approximation ADC.
   (b) Draw the schematic circuit diagram of a Servo A/D converter and explain the operations of this system.
   (c) Compare Servo A/D with other types of A/D converters. [7+6+3]
6. (a) What is meant by Tri-state logic ? Draw the circuit of Tri-state TTL logic and explain its functions.
   (b) Draw the schematic circuit of TTL active pull-up NAND gate and explain its operation with the help of Truth-Table. [8+8]
7. (a) What is the necessity of tri state buffer?
   (b) Design a 16-bit comparator using 74×85 ICs? [8+8]

8. (a) Distinguish between combinational and sequential circuit.
   (b) Define the following terms as applied to flip flops.
      i. Set up time.
      ii. Hold time.
      iii. Propagation delay.
      iv. Maximum clock frequency.
      v. Power dissipation. [8+8]

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